More Experimental Physics with Computers

I. OBJECTIVE....1
II. INTRODUCTION....1
III. EXERCISES(FROM *LABVIEW DEMONSTRATION BOOK*)....1
A. Module 2: Digital Thermometer VI....1
B. Module 3: Temperature Monitor VI....2
C. Module 4: Temperature Analysis VI....2
D. Module 5: Temperature Control VI....2

I. Objective

To develop a basic understanding of the software package LabVIEW.

II. Introduction

Last week we discussed how C++ programming simplifies complicated programs by hiding variables from parts of the program that do not need them. Today we will write simple programs using an application called LabVIEW designed specifically for interfacing a computer to a measuring device. Like C++ LabVIEW will reserve variables and operations only for those parts of the program that need them, and offers one additional twist: programs are written with pictures instead of with words.

As we did last week, we will write a program today that reads data from a (simulated) thermocouple and plots the data to the screen. The QuickBasic program we used last week to read a multimeter performed several tasks:

- Opening the multimeter for data transfer
- Rescaling the voltage by an appropriate amount for temperature conversion
- Looping to continue data taking until the key **Q** was typed
- Graphing data

The LabVIEW program we write today will also perform each of these tasks, but the approach to programming will be through pictures instead of commands.

III. Exercises(from *LabVIEW Demonstration Book*)

A. Module 2: Digital Thermometer VI

Objective:	to be introduced to LabVIEW and to create a virtual instrument that takes data from a thermocouple
Where to begin:	page 2-1 in the LabVIEW demonstration book
What to do:	perform the activities on pages 2-1 through 2-16
What to turn in to your instructor:	your log book and a printout of the block diagram
What to put in log book:	time your begin/end your work, new terminology

(1) Getting Started: To begin LabVIEW, double click the LabVIEW icon in Windows. Select the option **Explore LabVIEW**. As you work through the exercises, note the definitions for the following terms:

- **Virtual Instrument (VI)**
- **Front Panel**
- **Block Diagram**
- **Icon/Connector**
- **Dataflow Programming**

B. Module 3: Temperature Monitor VI

Objective:	to create a VI that monitors temperature readings collected by the VI created in Module 2
Where to begin:	page 3-1 in the LabVIEW demonstration book
What to do:	follow the instructions on pages 3-1 through 3-9
What to turn in to your instructor:	your log book, a copy of your block diagram
What to put in log book:	time you begin/end your work, problems encountered, solutions developed, interesting facts.

C. Module 4: Temperature Analysis VI

Objective:	to modify the VI created in Module 3 to perform a three point average of the data
Where to begin:	page 4-1 in the LabVIEW demonstration book
What to do:	follow the instructions on pages 4-1 through 4-4
What to turn in to your instructor:	your log book, a copy of your block diagram
What to put in log book:	time you begin/end your work, problems encountered, solutions developed, interesting facts.

D. Module 5: Temperature Control VI

Objective:	to modify the VI created in Module 4 to control the temperature of the experiment
Where to begin:	page 5-1 in the LabVIEW demonstration book
What to do:	follow the instructions on pages 5-1 through 5-5
What to turn in to your instructor:	your log book, a copy of your block diagram
What to put in log book:	time you begin/end your work, problems encountered, solutions developed, interesting facts.